



## **ATTACHMENT 8. QUALITY ASSURANCE**

Quality assurance and quality control is a required element to help execute each scope of work. Several project requirements are identified below regarding the proposed scope of work in order to assure that the project is technically sound, thoroughly reviewed and of high quality prior to proceeding with each phase.

This proposal includes appropriate and well-defined quality assurance and control measures. To ensure the highest quality of information is obtained, the project includes the quality assurances and quality control measures, but is not limited to the following:

### **PROCEDURAL ASSURANCES**

Quality assurance planning is a requirement of each technical team with each group having to document the following:

- Procedure submittal for executing quality assurance, milestone dates, and responsible individuals will be required for FMFCD review two weeks prior to start of task.
- Technical concept and criteria validation shall be through a peer review process by senior technically qualified individuals.
- Office Assistants or Engineer shall read all written documents prior to submittal for content, style, grammar, and formatting.
- Scheduled quality assurance milestones will be a requirement for an approved project schedule.

As identified in the work plan, a qualified contractor and consultant will complete the scope of work, which includes several planned quality control checks of the technical work. To ensure adequate analyses, review of each document and deliverable produced to classify soil samples will be completed by a licensed engineer.

In addition, the FMFCD Engineer and Inspector will coordinate and communicate regularly with the consultants during the entire project to ensure that the data reflects the known information about the project area. In this process, the Engineer will communicate with the Operations Engineer the progress of each task throughout the project.

### **PERSONNEL QUALIFICATIONS**

The FMFCD Engineer, Mr. John Santos, who is a California Registered Civil Engineer and has over four (4) years of training, design, construction, and experience with project managing, will communicate often with the contractor, consultant and Mr. Peter Sanchez, (Operations Engineer) to assure quality work and quality control throughout the project. During the monthly Operations Management Meetings, the Operations Engineer will inform the District Engineer the progress of the project to insure the project is on schedule. The Operations Engineer has over twenty-two (22) years of experience, and is a California Registered Civil Engineer.

The recharge improvements will be contracted with a licensed and experienced contractor. The contractor will contain a Class A: General Engineering Contractor license or a Class C-57: Well Drilling Contractor license. The survey work for construction and for the collection of the soil samples will be conducted by an experienced staff member who holds a Professional Surveyor license or a Professional Engineer license. Mr. Dwayne Farrow will oversee the construction of the gravity drains. Mr. Farrow has twenty-six (26) years of experience in construction and over six (6) years of inspecting for FMFCD. OSHA health and safety standards will be required during construction of recharge improvements.

The technical elements will be contracted with a consulting geotechnical firm who are experienced and qualified for completing the work. The technical teams will include advanced degrees in classifying soil samples, license requirements for professional engineers, as well as a range of years of experience to balance technical experience with youthful perspective. Soil samplings will be overseen by Mr. Santos to ensure the locations and improvements are according to plans.

#### **PUBLIC NOTICES AND CONTRACTING PROCEDURES**

Mr. John Santos will develop the draft contract specifications. The draft specifications will be formatted and reviewed by an FMFCD office assistant, Mrs. Terri Schaffer. They will then be reviewed, scrutinized, and eventually approved by Mr. Peter Sanchez. Mrs. Terri Schaffer has over nineteen (19) years of experience.

FMFCD will then follow the formal bidding procedure as outlined in the FMFCD's Contracting Procedures policy manual and as specified in Exhibit D, section 8 of the grant agreement. This will involve a fourteen (14) day notice being advertised in a local newspaper, a fifteen (15) day notice being advertised in several trade journals, a formal bid opening, and FMFCD Board approval.

The FMFCD selection process will be a qualifications based process focused on sound technical skills, reliable individual experience, and professional reputation and depth with the firm.

#### **STANDARDIZED METHODOLOGIES AND ANALYSES**

Basins will be dewatered in advance prior to surveying the ground elevation of each gravity drain and each boring (per basin), by a qualified FMFCD field personnel under the supervision of the FMFCD Facilities Manager, Mr. Paul Allen, who has over twenty-three (23) years of experience.

The ground elevations of the top of the gravity drains and the borings will be determined and the locations will be staked a couple of days before the construction of the recharge improvements and before boring begin. The timing of the survey will be such that the basin will dewatered and dried so the survey crew can work safely and efficiently. The survey work will be conducted by an experienced staff member who holds a Professional Surveyor license or a Professional Engineer license.

#### ***Gravity Drains Method***

After the elevation of the areas for recharge improvements is identified, a contractor licensed in the State of California with a valid Class C-57 (Well Drilling) or Class A (General Engineering) license will drill



and install the gravity drains. Occupational Safety and Health Administration health and safety standards will be required during gravity drain construction.

### ***Collection of Soil Data***

After the elevation for each boring location is determined, a geotechnical engineering firm licensed in the State of California with a valid Class C-57 license will drill the borings. Materials will be classified and logged by qualified personnel and checked by a California registered civil or geotechnical engineer. Classification procedures will follow ASTM test method D2487-10 “Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)” and method D2488-09a “Standard Practice for Description and Identification of Soils (Visual – Manual Procedure).”

### **INFORMATION GAINED**

The improvement to the proposed basins will identify the efficiency of the gravity drains as they will be monitored by FMFCD. This will give a better understanding of how gravity drains affect not only surface water recharge, but stormwater recharge as well. Over time, data will assist in long-term studies that will assist in future design of similar projects.

The six (6) or more basin locations proposed for collecting soil data currently have limited or no data available on their soil profiles. FMFCD proposes to collect two (2) 50 feet in depth borings at each site along with fifteen (15) foot borings per every 1.5 acres of basin floor. This will provide a representation of soil characteristics at each location. Specifically, boring results will identify:

- Soil types
- Consistency of soils within basin sites
- Locations of desirable, high permeability soils
- Locations and depths/thickness of obstructive soils
- Potential designation on basin secondary use
- Potential alteration to basin design and geometry to increase infiltration rates
- Potential alteration to profile data by over-excavating and backfilling with more permeable material to maximize infiltration

With this information, FMFCD will be better able to identify and prioritize projects at and near the basin sites to enhance recharge efforts at those locations. Data may also indicate locations where such projects would not be beneficial.

### **QUALITY ASSURANCE MEASURES**

Mr. Brent Sunamoto (Senior Engineer) closely monitors all of FMFCD’s recharge basins to maximize performance. FMFCD monitors its recharge basins using several mechanisms. These include: monthly delivery reports from FID, percolation rate tests, and recharge reports of current recharge basin conditions. Data from these mechanisms are used to model future surface water recharge and stormwater recharge of past rainfall events. Mr. Sunamoto has over sixteen (16) years of experience, and is a California Registered Civil Engineer.



Basins to be physically improved will continue to be monitored using the current mechanisms in place. In addition, FMFCD will perform additional studies on physically improved sites to gain a better understanding of their benefits as well as how these improvements will translate to other basin sites. These studies will focus on, but not be limited to:

- ***Degree Of Improvement***

This will analyze the amount of recharge improvement provided. Recent deliveries will be compared to historic deliveries, prior to the improvements, to quantify the amount of improvement.

- ***Maintenance Required To Sustain Improved Recharge Rates***

As referenced above, improved basin sites will be monitored closely. If performance declines, the improvements will be inspected to determine the best course of action for maintenance.

- ***Cost-Benefit Of Improvements***

This will not only analyze the cost (construction and maintenance) of the improvements and the recharge benefit provided, but also analyze the value of the additional water recharged due to the improvements. The Cities of Fresno and Clovis recently constructed several surface water treatment plants that are expensive to operate. The costs of the improvements related to the amount of recharge benefit gained will be compared to the cost to treat the same volume of water to determine the true benefit to the public.

### **PROGRESS PROJECT REPORTS**

Mr. John Santos will write the draft copy of the progress reports and have Mrs. Terri Schaffer review and format the draft reports as necessary. Mr. Peter Sanchez will review and scrutinize the progress reports. After Mr. Sanchez approves of the progress reports, they will be sent to the FMFCD District Engineer, Mr. Jerry Lakeman who will review, scrutinize, and eventually approve of them. Mr. Jerry Lakeman has over forty (40) years of experience, and is a California Registered Civil Engineer and a California Registered Land Surveyor.

### **FINAL REPORT**

The same procedure used for the progress reports will be used for the final report.